

Appln. No. 10/550,829
Amtd. Dated: September 6, 2007
Reply to Office Action of June 6, 2007

REMARKS

Claims 1 – 19 are currently pending. No new matter has been introduced by the amendment of claims 4 and 12. The amendment to claim 4 corrects a minor typographical error and the support for the amendment of claim 12 is found on page 14, lines 4 through 12 of the present application.

The Examiner has rejected claims 1 – 19 under 35 U.S.C. §§ 101, 102, 103, and 112, second paragraph. Applicants respectfully traverse the Examiner’s rejections and request reconsideration and withdrawal of the rejections based on the following remarks.

Rejection of claim 12 under 35 U.S.C. §§ 101 and 112, second paragraph

The Examiner rejects claim 12 under 35 U.S.C. §§ 101 and 112, second paragraph, and asserts that the claim is directed to a use, but is indefinite and an improper definition of a process because it does not set forth any steps involved in a method/process.

As currently amended, claim 12 is directed to a method that includes the step of contacting a surface with a solution according to any one of claims 1 – 3. Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §§ 101 and 112, second paragraph.

Rejection of claims 1, 6, 8 – 10, 12 – 14, 17, and 19 under 35 U.S.C. § 102(b)

The Examiner rejected claims 1, 6, and 8 – 10 under 35 U.S.C. § 102(b) as being anticipated by either British Patent GB 1,546,524 to Shipley (“Shipley”) or French Patent FR 2,392,100 to Goffinet (“Goffinet”). The Examiner also rejected claims 12 – 14, 17, and 19 under 35 U.S.C. § 102(b) as being anticipated by Goffinet. The Examiner asserts that Shipley and Goffinet disclose every element of Applicants’ invention. Applicants respectfully disagree.

Shipley and Goffinet do not disclose every element of Applicants’ invention. Applicants claim a solution for etching copper or a copper alloy comprising at least one substance selected from the group comprising aromatic sulfonic acids and salts of the aromatic sulfonic acids *characterized in that the solution is free of sulfate ions*. Shipley and Goffinet do not disclose a solution free of sulfate ions. Chemical suppliers do not provide pure aromatic sulfonic acids. One of the impurities in aromatic sulfonic acids is sulfuric acid because sulfuric acid is a material used in the synthesis of aromatic sulfonic acids. The sulfuric acid cannot be completely removed. Because trace amounts of sulfuric acid are contained in the aromatic sulfonic acids sold on the market, sulfate ions are present, normally between 2 – 5%. Additional sulfate ions are also generated due to the natural production of sulfuric acid when aromatic sulfonic acids hydrolyze according to the reaction below:



Applicants claim a solution that is free of sulfate ions, defined by the Applicants on page 8, lines 1 – 10 of the present specification as being less than 0.2% (w/v) and this

concentration is achieved by reducing the number of sulfate ions which are naturally present. For example, reacting the aromatic sulfonic acids with barium chloride will form a barium sulfate precipitate that will fall out of solution, as suggested on page 8, lines 12 – 27 of the present specification. Neither Shipley nor Goffinet disclose a solution that includes aromatic sulfonic acids and salts of the aromatic sulfonic acids wherein the solution is free of sulfate ions. Shipley’s solution incorporates molybdenum compounds with an acid, a peroxide, and a stabilizer and Goffinet’s solution includes mineral acids that are substantially made of a phosphoric acid, an oxidizing agent, a stabilizing agent, and a solvent. Neither of the solutions taught by Shipley and Goffinet includes aromatic sulfonic acids and salts of the aromatic sulfonic acid that are free of sulfate ions. Because neither reference includes this element, both references fail to anticipate claim 1, as well as all of the claims that depend from claim 1.

Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. § 102(b).

Rejection of claims 2-5, 7, 11, 15, 16, and 18 under 35 U.S.C. § 103(a)

The Examiner rejects 2 – 5, 7, 11, 15, 16, and 18 under 35 U.S.C. § 103(a). The Examiner first asserts that claims 2 – 5, 7, 15, and 16 are unpatentable over Goffinet in view of US Patent 6,036,758 to Fairweather et al. (“Fairweather”) because Goffinet teaches the invention substantially as claimed and Fairweather teaches the inclusion of a corrosion inhibitor and pre-cleaning with acid. The Examiner opines that it would have been obvious to one ordinary skill in the art at the time of invention to include a corrosion inhibitor or pre-clean using sulfuric acid. The Examiner then asserts that claim 11 is

unpatentable over Goffinet in view of European Patent EP 1 167 585 to Hongo et al. (“Hongo”) because Goffinet teaches the invention substantially as claimed and Hongo teaches the inclusion of at least one adjuvant selected from the group comprising polyethylene glycol, polypropylene glycol and the derivatives thereof. The Examiner opines that it would have been obvious to one of ordinary skill in the art at the time of invention to include at least one adjuvant from the group comprising polyethylene glycol, polypropylene glycol to increase the solution viscosity. Finally, the Examiner asserts that claim 18 is unpatentable over Goffinet because using nickel-gold and tin are well known for coating a copper layer in the circuit forming arts. Applicants respectfully disagree.

The references would not have suggested to a person having ordinary skill in the art at the time of Applicants’ invention was made that Applicants’ invention was obvious. The references neither disclose all of the elements of Applicants’ invention, nor do the references suggest the elements of Applicants’ invention.

As previously discussed Goffinet fails to teach a solution that includes aromatic sulfonic acids and salts of aromatic sulfonic acids wherein the solution is free of sulfate ions. The remaining references relied upon by the Examiner also fail to disclose all of the elements of Applicants’ invention. Goffinet is concerned with including a phosphoric acid in a copper etching solution. Fairweather teaches a solution that includes an aromatic sulfonic acid and sulfuric acid. Hongo discloses a method and apparatus of etching a substrate.

The Examiner incorrectly states that Goffinet teaches the invention substantially as claimed because Goffinet neither discloses, nor suggests a solution that is free of sulfate ions. By including aromatic sulfonic acids in an etching solution, a person who practices any of the solutions disclosed by Goffinet, Fairweather, or Hongo will have a solution with a high concentration of sulfate ions relative to Applicants' claimed solution because aromatic sulfonic acids are always accompanied by sulfate ions. The solution taught by Fairweather will have the highest concentration because Fairweather encourages the use of sulfuric acid at a concentration of 2 to 20% in the total composition of the solution (col. 3, lines 14-19). This is counter to Applicants' invention which maintains a solution free of sulfate ions. As mentioned above, Hongo is concerned with a particular method and an apparatus for etching and does not disclose a solution that is free of sulfate ions. The Examiner has also failed to provide any suggestion that would have been present for a person skilled in the art at the time of Applicants' invention to combine and modify the references to produce a solution free of sulfate ions. Therefore, the references either by themselves or in combination would not suggest to a person having ordinary skill in the art at the time of Applicant's invention which includes a solution free of sulfate ions.

Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a).

CONCLUSION

In view of the foregoing amendments and remarks, Applicants submit that the claims presented herewith are patentable over the prior art of record and in condition for allowance. Applicants respectfully solicit prompt action thereon. If any questions remain, the Examiner is invited to phone the undersigned attorney.

Respectfully submitted,

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